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THE QUICK RESPONSE MULTICOLOR PRINTER (QRMP) SYSTEM(U)
ARMY ENGINEER TOPOGRAPHIC LABS FORT BELVOIR VA
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THE QUICK RESPONSE MULTICOLOR PRINTER (QRMP) SYSTEM

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ABSTRACT

The Quick Response Multicolor Printer (QRMP), which has recently completed the 6.3 development phase, uses laser-xerography to produce full-size process color reproductions of topographic products. Copies can be produced from color map or chart originals, transparencies, and a yet to be defined digital data file. With scanning resolutions of 400 and 800 lines per inch, the QRMP can be configured to operate in a reproduction, facsimile, or a digital mode. This paper will briefly describe the Operational and Organizational plan for the QRMP's deployment, QRMP system characteristics, how the QRMP works, the Program Schedule, and the anticipated Operational Improvements when the QRMP is deployed.

INTRODUCTION

The single-color offset lithographic printing system currently used in the field is based on the same printing process used by the Army since World War II. It economically produces large quantities of printed material. However, because of the time-consuming platemaking and press set-up procedures, it does not provide the tactical commander with a quick response reproduction capability to produce standard and special topographic products. Nor does it efficiently perform low-volume multicolor printing tasks.

The Reproduction Section of the Engineer Cartographic Company (05-337 TOE), at Corps and Echelon above Corps (EAC) consists of 27 soldiers and various related reproduction equipment housed in ten 30-foot semitrailer mounted vans. In order to produce an original five color product through the photolithographic process, all of these troops interact with the various equipment for approximately 48 hours before the first graphic is produced. If reproducible (negatives) material is available it will still require eight hours and three soldiers to produce the first five color graphic.

In addition, the mobility of the current system is limited for three reasons. First, the Cartographic Company does not have sufficient prime movers (5-ton tractors) for simultaneous movement of the unit, so additional prime movers from Corps and EAC assets must be obtained for quick relocation of the unit. Secondly, during air deployments the semitrailer modules housing the outsized and overweight reproduction equipment are transportable in C-5A aircraft only. Consequently, there is no reproduction support for the light infantry divisions which deploy in C-141 and C-130 aircraft. Finally, off-road moves may cause damage to the equipment and/or create an excessive recalibration requirement.

QRMP OPERATIONAL AND ORGANIZATIONAL PLAN

The QRMP is being developed by the U.S. Army Engineer Topographic Laboratories to provide engineer topographic units with a rapid, low volume reproduction capability for large format (22.5 x 29.5 inch), multicolor products using equipment that is tactically mobile, has low signature, and requires only one dedicated operator. It will replace the present lithographic printing press support required at EAC and Corps level. The QRMP will also be deployed at Division level where no topographic printing capability currently exists. The QRMP system will be employed in direct support of each Division and Corps Headquarters. One QRMP system will be co-located with the Division Terrain Team. Two QRMP systems will replace lithographic presses and support equipment (plate, layout, photomechanical, camera, and paper conditioner) in Corps Photographic units. At Corps, one QRMP system will be located in the Engineer Terrain Team Tactical Operations Center at Corps Main while two QRMP systems will be located with the Corps Engineer Cartographic Company at Corps Rear.



QRMP SYSTEM CHARACTERISTICS

The QRMP system will consist of a militarized, ruggedized QRMP housed in an International Standards Organization (ISO) container mounted on a 5-ton prime mover with a dedicated 30 kw Military Standard generator. This system will carry, inside the ISO container, a minimum seven day supply of all materials necessary to reproduce multicolor topographic products. Thus, the system will be self-sufficient and have the same mobility as supported units.

The initial system input will consist of any type of hardcopy original ranging from preprinted standard maps.

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maps with color annotation, photographs, photos with annotation, composite paste ups and transparent originals. The Advanced Development (AD) QRMP is capable of accepting hard copies of all graphic outputs of the Digital Topographic Support System (DTSS), including those that may result from the AirLand Battlefield Environment (ALBE) effort. These products can be input to the QRMP and reproduced at a rate of up to 75 multicolor copies or 225 monochrome copies per hour on standard map paper or transparency material. The copies produced are distortion free and maintain the color fidelity of the original input product.

After completion of a Preplanned Product Improvement in 4QFY93 the system will have the additional capability of producing hard copy graphics from digital data provided by DMA, other automated field systems such as DTSS or digital data that has been digitized by a QRMP at a different location and transmitted to the system.

HOW THE QRMP WORKS

The three subsystems that make up the QRMP are: (1) Image Processing Electronics (IPE); (2) the Raster Input Scanner (RIS)/Raster Output Scanner (ROS); and (3) the Reproduction Engine. In a reproduction mode the QRMP works in the following manner. An input product is placed on the RIS drum and is subjected to a raster scan by separate red, blue, and green lasers. The reflected light signal passes through three photomultiplier tubes equipped with red, blue, and green filters, respectively, and is converted into electronic signals. The electronic signals are fed to the IPE which in turn controls the ROS. The ROS, a blue laser, is used to expose the photoreceptor located in the Reproduction Engine. In operation, this photoreceptor, a rotating drum, first receives a charge from a corona device. The ROS laser, scanning along the drum in an axial direction then discharges the portion of the photoreceptor that does not correspond to the color of the original input products. The process (magenta, cyan, and yellow) and black toners are attracted to only the charged image area of the photoreceptor that corresponds to the color location of the original graphic. The different color toners are then electrostatically transferred to the paper by contact with the photoreceptor. The process color and black toners can reproduce any hue in the color spectrum. After the toners are transferred, in sequence, the image is fused by heat and permanently bonded to the paper. The process is complete when the finished product is deposited in the delivery tray at the front of the machine.

When operating with the Digital Interface, using digitized data as an input, the RIS is inactive and a digital signal is fed directly to the blue laser of the ROS which completes the reproduction process that has been previously described.

QRMP SCHEDULE

The AD of the QRMP was started in August 1980 and was completed with the fabrication of the AD model in December 1983. Development Test I and Operational Test I were completed in March 1985. At present, a Design Improvements Study is being conducted to further refine certain aspects of the hardware design prior to entering Full Scale Engineering Development (FSED). FSED is scheduled to begin in 1QFY88 and will be completed upon delivery of two ruggedized, mobile QRMP systems in 4QFY90. Development Test II and Operational Test II are scheduled for FY90 with First Unit Equipped (FUE) in 3QFY92.

OPERATIONAL IMPROVEMENTS

The completion of the QRMP development and fielding of the QRMP system will provide Engineer Topographic units with the following operational improvements:

1. Reproduction of special graphics in a timely, useful fashion.
2. Quick turnaround, low volume reproduction capability.
3. Reproduction capability at division level.
4. Reduction in battlefield signature.
5. Reduction of reproduction personnel requirements.
6. Capability, with the Digital Interface, of producing hard copy graphics from digital data.

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